

ENGLISH

27, 1885.

126 - FOR. 100

Hopkinson,

2687, Feb. 27, 1885

3 Sh. - Sh.

FIG. 1

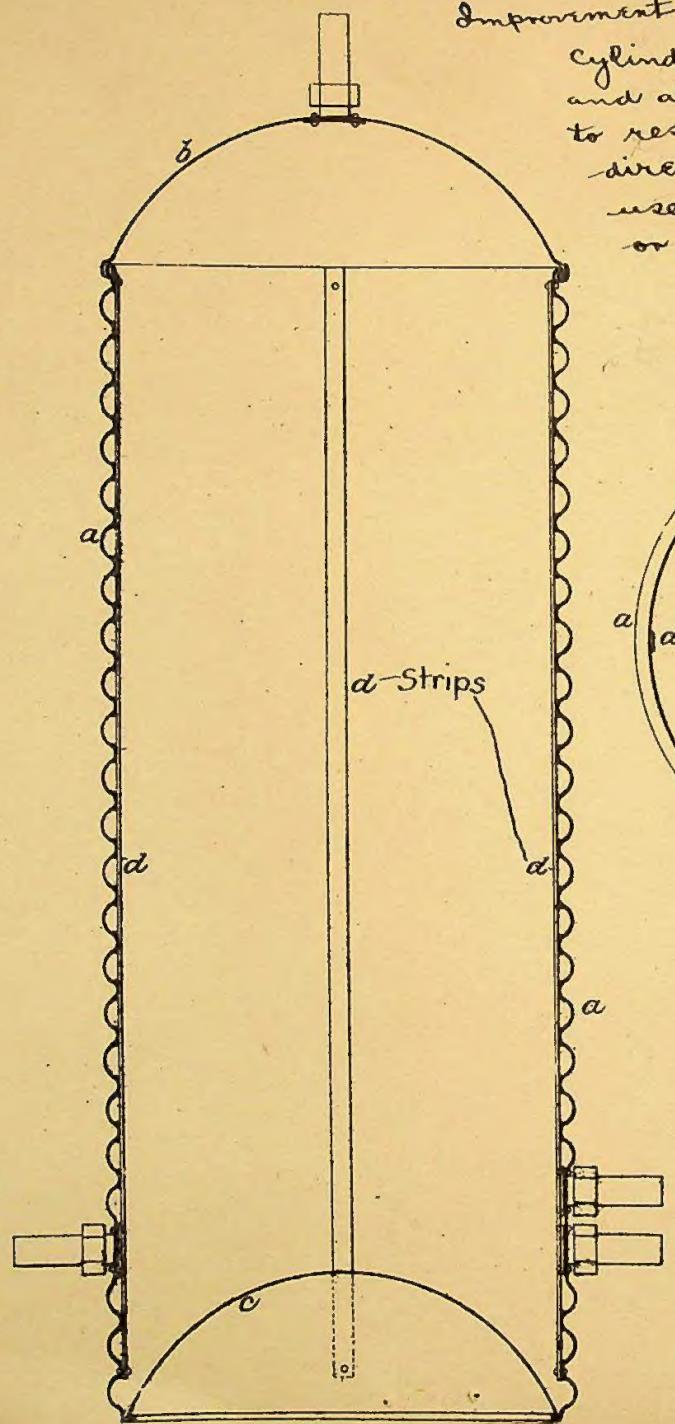
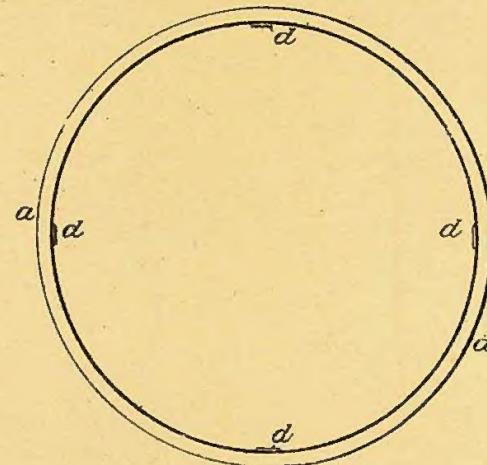


FIG. 1.



Improvement on 3108 of 1884 to Hopkinson.  
Cylinders are provided with corrugations  
and also with longitudinal strips d  
to resist collapse in longitudinal  
direction. Rod or tube d' may be  
used in place of strips (Fig. 2)  
or with strips (Figs. 3 & 4).

FIG. 2

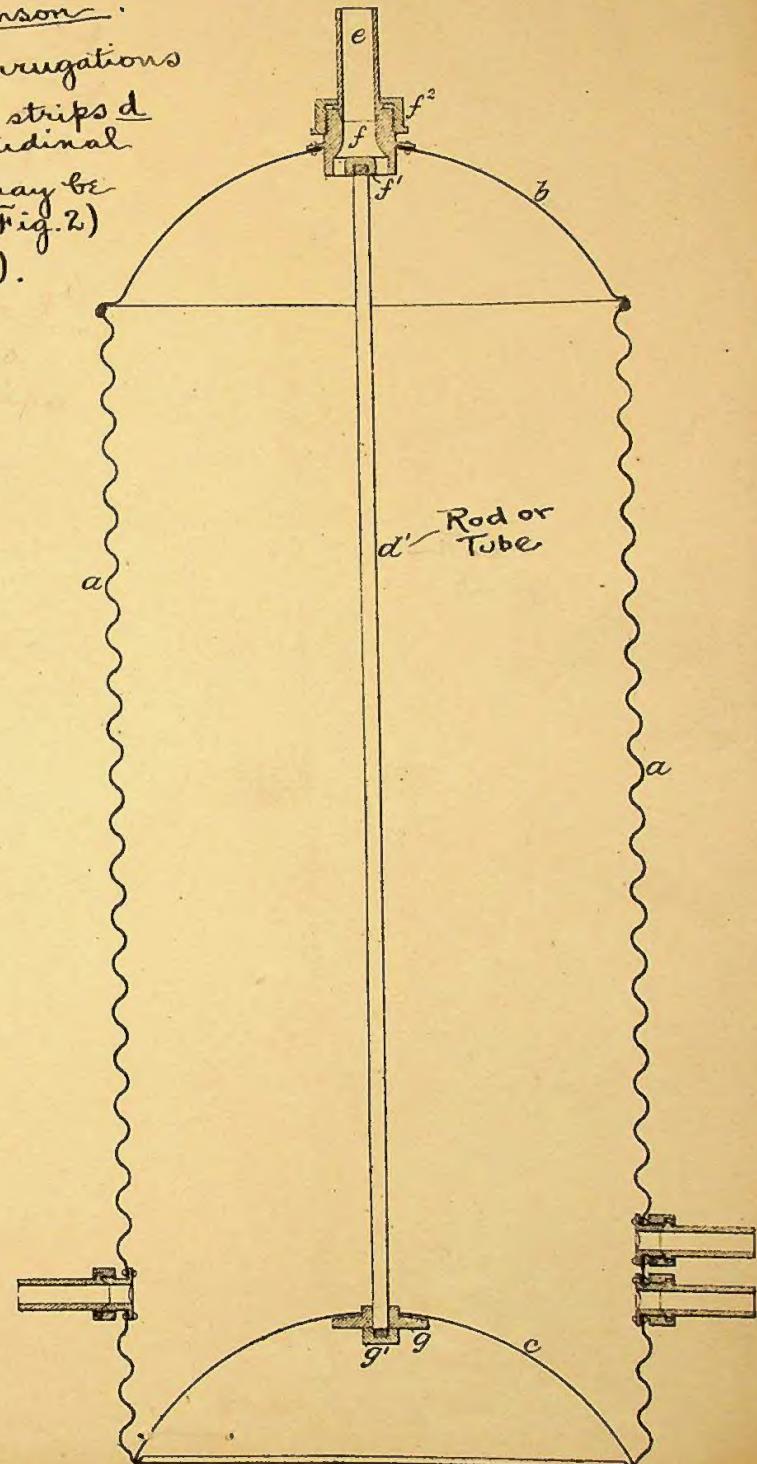
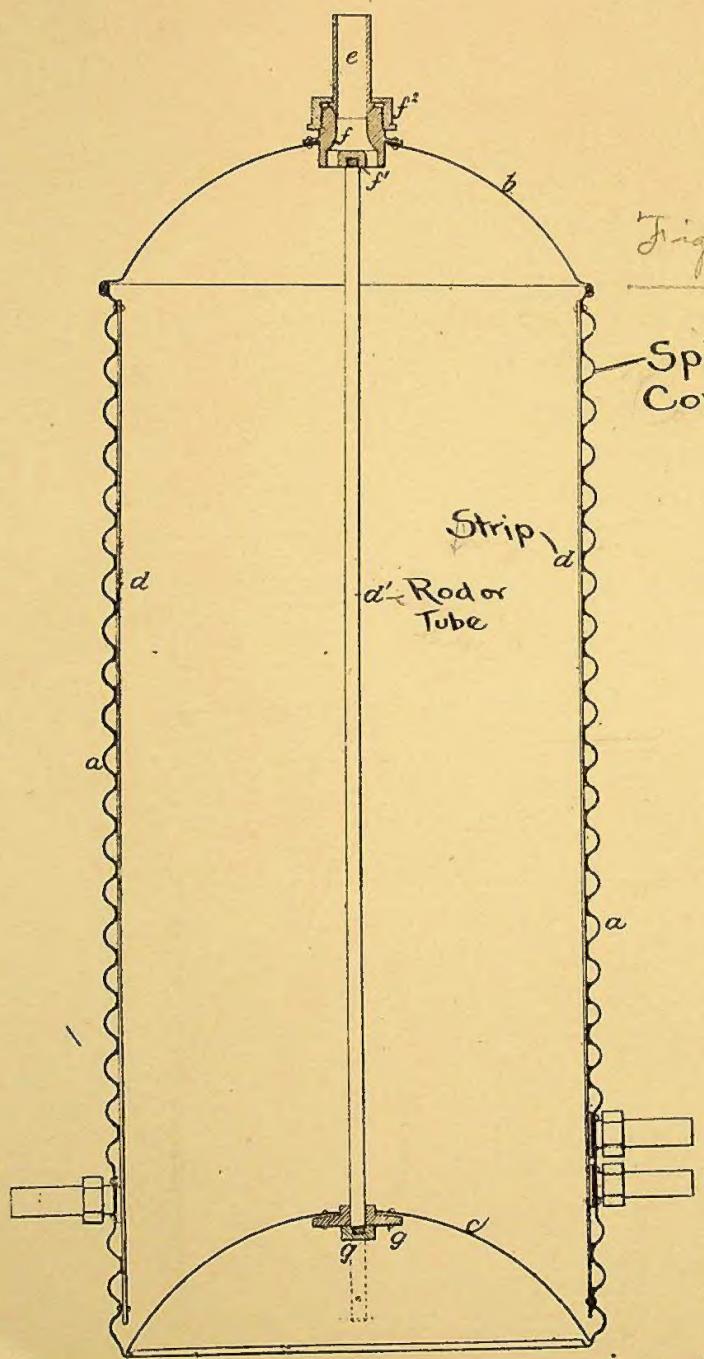


PHOTO.

JUL 31 1899

Cast

FIG. 3.

Figs. 3 + 4

Spiral  
Corrugations

FIG. 4.

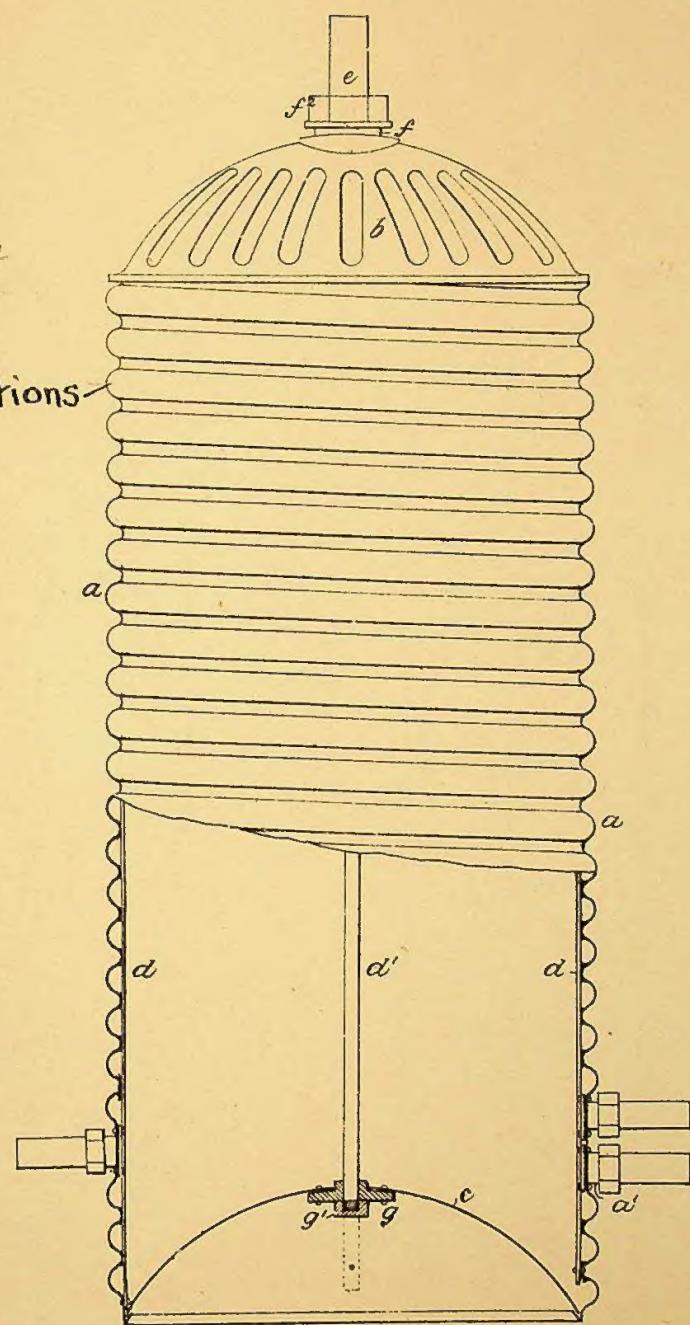


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JUL 21 1898

Cost

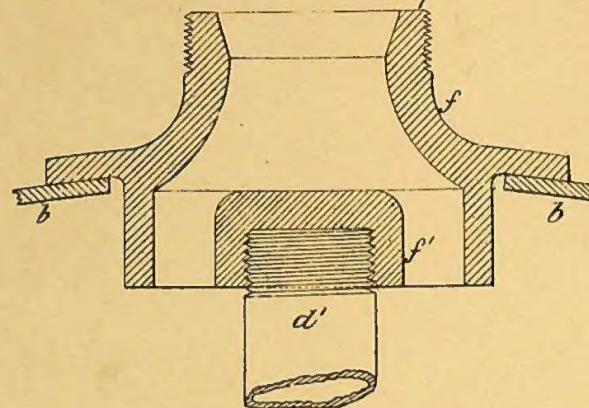
and Poles

2687 of 1885

sh 3

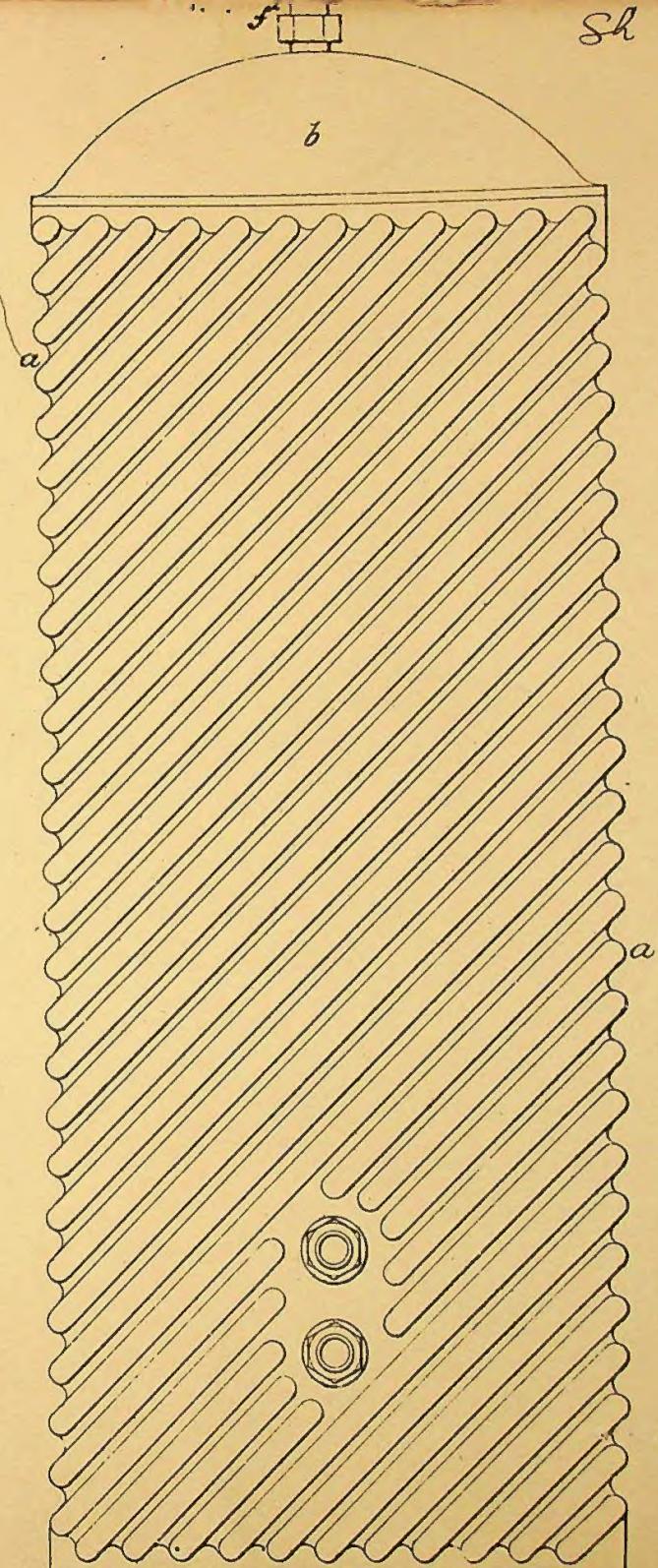
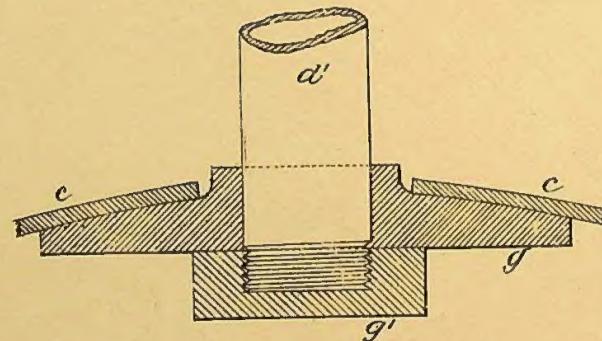
Outlet fitting with pocket  
f' for central rod or tube.

FIG. 5.



Spiral corrugation  
resists endwise  
stress as well  
as circular  
stress.

FIG. 6.



PHOTO

JUL 21 1898

*Cost*

*Stand Boilers*

A.D. 1885, 27th FEBRUARY. N° 2687.

Improvements in Hot-water Apparatus for Domestic and similar Purposes.

COMPLETE SPECIFICATION.

We, JOHN ADDY HOPKINSON, and JOSEPH HOPKINSON, both of the firm of J. Hopkinson & C°, of Huddersfield, in the County of York, Engineers, do hereby declare the nature of our invention for "IMPROVEMENTS IN HOT WATER APPARATUS FOR DOMESTIC AND SIMILAR PURPOSES" and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Our invention relates to improvements in apparatus of the class described in the specification of our former Letters Patent dated 11<sup>th</sup> February, A.D. 1884, N° 3108.

- 10 In the said specification, we have described cylinders of peculiar construction to be substituted for the ordinary receptacles used in apparatus for supplying hot water for domestic and similar purposes.

These cylinders, as described in our said specification, are constructed with a shell or body of sheet metal having a corrugated, or similar configuration for the purpose of preventing the collapse of the cylinder by reason of the existence of a vacuum or partial vacuum therein.

This corrugated construction of the said portion of the hot-water apparatus is fully efficient for the prevention of accidents from the above cause, but we have ascertained that we can still further improve the said apparatus and increase its efficiency as follows, that is to say:—We combine, in the construction of the said cylinder, the means for preventing its collapse, with means for resisting pressure in the direction of its length, so that we obviate all possibility of danger or inconvenience which might arise either from the crushing in or flattening of its sides, or from alteration in its length by reason of excessive pressure or of the existence of a vacuum. For this purpose, we use the peculiar devices or arrangements hereinafter described and illustrated in the accompanying drawings.

In these drawings,

Figures 1, 2, 3, are central vertical sections of cylinders constructed according to our present invention.

- 30 Figure 1<sup>a</sup> is a horizontal section of the cylinder shewn in Figure 1.

Figure 4 is an elevation, partly in central vertical section, illustrating a modification of our invention.

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Figures 5 and 6 are transverse sections of parts shewn in Figures 2 and 3, drawn to an enlarged scale.

Figure 7 is an elevation of a cylinder, illustrating another modification of our invention.

Like letters of reference indicate the same parts throughout the drawings. 5

We have shewn the shell or body *a* of the cylinder formed with regular or uniform corrugations throughout its length, and properly united to the end, or top and bottom, plates *b*, *c*:

In Figures 1, 2, 3, the corrugations of the shell are annular; in figures 4 and 7 they are spiral. But we wish it distinctly understood that, inasmuch as the form, pattern or arrangement of the corrugated surface of the shell, in any manner that will strengthen the cylinder against external pressure, forms the subject of our said former Letters Patent, it constitutes no part of our present invention, that is to say, the cylinder or vessel may have its corrugations made annular or spiral according to either of the herein described forms or examples, or as shewn in our 10 said former specification, or according to any other suitable manner or pattern. And under the term corrugated we include any regular or irregular formation of projections or depressions extending annularly or spirally in, and around, the shell. 15

In Figures 1 and 1<sup>a</sup>, we have shewn a cylinder provided with longitudinal ties formed of flat metal bars or strips *d* applied to the corrugated shell *a* of the 20 cylinder in such a manner as to resist elongation or contraction of the same. These bars or strips are formed of thin copper or other suitable material, either flat or of any other suitable form in transverse section. We have shewn four of these longitudinal bars or strips *d*, but any other convenient number may be used. The said bars *d* are attached to the corrugated shell at each end of the same, and 25 at such intermediate points as may be most desirable.

In the cylinder or vessel shewn in Figure 2, we tie the end plates *b*, *c* together by means of a central rod or tube *d*<sup>1</sup> and we use, in combination therewith, the peculiar devices shewn in Figures 5 and 6.

The device or part shewn in Figure 5 is constructed to serve the double purpose 30 of a coupling for the stay rod or tube *d*<sup>1</sup> and a connection for the relief or egress pipe *e*.

The part *f* which is formed of gun metal or other suitable material is attached by its flange to the end plate *b*. It has a socket at *f*<sup>1</sup> formed with a screw-thread corresponding with a thread on the end of the stay-rod *d*<sup>1</sup>, which is thereby 35 securely united with the said socket. The said part *f* is provided with a screw-cap *f*<sup>2</sup>, which is to be placed over the collar on the end of the relief pipe *e* and screwed down thereon to secure the said pipe in place, as shewn in Figures 2 and 3.

It will be seen that the aperture or way through the said device is so formed 40 that the free passage of the water through the same will not be obstructed or impeded by the socket *f*<sup>1</sup>.

The device *g* shewn in Figure 6 is a flanged metal piece, which is secured to the end plate *c* in any suitable manner; it has an aperture through which the lower end of the rod or tube *d*<sup>1</sup> extends, and there is a nut at *g*<sup>1</sup> for securing 45 the said rod or tube in place.

The combination of these devices or parts *f*, *g*, with the stay rod or tube affords very convenient means for adjusting the tension of the said rod, so that it may act most effectually to ensure the stability of the ends and prevent alteration in the length of the cylinder. 50

In Figure 3, we have shewn a cylinder in which we combine the tie bars or strips shewn in Figure 1 with the central rod or tube and its connections as shewn in Figure 2.

In Figure 4, we have shewn a cylinder corrugated uniformly or regularly, but spirally instead of annularly as in Figures 1, 2 and 3. And we have shewn this 55 cylinder provided with the central stay rod and connections such as those shewn

*J. A. & J. Hopkinson's Improvements in Hot-water Apparatus, &c.*

in Figures 2 and 3 in combination with the flat bars or strips arranged as shewn in Figure 1.

The ends of our improved cylinders are made either plain or corrugated and either curved or flat in transverse section, as may be desired.

- 5 The cylinder shewn in Figure 7 is corrugated in a peculiar manner, that is to say, its corrugations are formed spirally around the shell with a very "quick" inclination or pitch, as in the case of a screw with a double or other multiple thread. This arrangement is a development of the principle utilized by us for resisting external pressure, as set forth in our said former specification, and affords
- 10 the means whereby we further utilize the corrugated formation for the purpose of our present invention, that is to say, by forming the ribs, projections or corrugations as shewn, they extend in a direction favorable to their efficiency in resisting endwise stress, and therefore will, to some extent, effect, or assist in effecting, the purpose of our invention.
- 15 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is

The improvements relating to hot-water apparatus and consisting in the combination, with the corrugated, or similarly formed, cylinder or vessel, of means substantially as herein described for resisting endwise pressure, for the purposes specified.

Dated this 27th day of February 1885.

JOSEPH HOPKINSON,  
For self and the said John Addy Hopkinson.

Haseltine, Lake & Co.,  
Agents.

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For Her Majesty's Stationery Office.

1885.